

Remarks/Arguments

Regarding the Amendments

In the specification, paragraphs [0021] and [0025] were amended by replacing R with R¹.

Claims 2 and 17 were amended by replacing $[[R_3]]$ with “R”. This amendment corrects a typographical error and clarifies the claim. These amendments do not change the scope of the claims.

Claims 10 and 25 were amended by clarifying that O represents oxygen. These amendments do not change the scope of the claims.

Claims 10 and 25 were amended by replacing $[[M'O_pR_qX_r]]$ with $M'O_pR_q^1X_r$ and replacing R with R¹. This amendment was made for clarity and does not add new matter or change the scope of the claims.

Rejections under 35 U.S.C. §112

Claims 1 and 16 were rejected as allegedly being indefinite because the meaning of R₃M is unclear. R₃M refers to a metal compound (M) bonded to three R groups. This meaning is apparent in view of the Markush groups recited in claims 3 and 18 and is now further clarified by the amendments to claims 2 and 17.

Claims 10 and 25 were rejected for failing to distinguish “R” in those claims from “R” in claims 1 and 16. Claims 10 and 25 were amended by replacing R with R¹, thereby distinguishing it from claims 1 and 16. Claims 10 and 25 were also rejected because O was not defined. These claims were amended to specifically point out that O represents oxygen, as would be expected by one of skill in the art. Applicants respectfully request that the rejections under 35 U.S.C. § 112 be withdrawn.

Rejections under 35 U.S.C. § 103

Claims 1-5, 8-20, and 23-29 were rejected under 35 U.S.C. 103 as allegedly being unpatentable over U.S. Patent No. 6,271,165, by Jacobs et al. in view of U.S. Patent No. 6,403,518, by Ward. Specifically, The Examiner stated that Jacobsen discloses supported and non-supported catalysts having (a) alkyl aluminum, alkyl boron, alkyl gallium, or alkyl indium with an ammonium having an N-H bond; (b) dialkyl magnesium; (c) cyclic diene and early transition metal. The Examiner alleged that Jacobsen also discloses hydrocarbon solvent and triethylaluminum co-catalyst, and a method of co-polymerizing alpha olefin. The Examiner stated that Jacobsen does not specifically disclose alkyl boron, alkyl gallium, or alkyl indium where all three ligands are identical reacted with an N-H bond. The Examiner further stated that Jacobsen does not disclose a halogenated magnesium support, nor the use of Ziegler Natta catalysts rather than metallocene catalysts.

The Examiner alleged that Ward discloses trialkyl aluminum and boron where the ligands are each the same and the non-ionic form of the complex using amines. The Examiner alleged that Ward discloses inorganic oxide carriers, magnesium chloride carrier and polymeric carriers. The Examiner further alleged that Ward discloses the use of both metallocene and Ziegler Natta catalysts.

The Examiner alleged that it would have been obvious to substitute the ionic compound of Jacobsen for the non-ionic compound of Ward where the amine coordinates with the Lewis Acid. The Examiner further alleged that it would have been obvious to substitute the magnesium chloride of Ward for the magnesium oxide of Jacobsen because the magnesium chloride is more reactive towards the ligand and would provide a better bonding surface for the ligand to attach to the support surface. The Examiner further alleged that it would have been obvious to substitute

the metallocene catalyst components for Ward's Ziegler Natta catalyst because it is easier to bind a Ziegler Natta catalyst to an inorganic support. Applicants respectfully traverse.

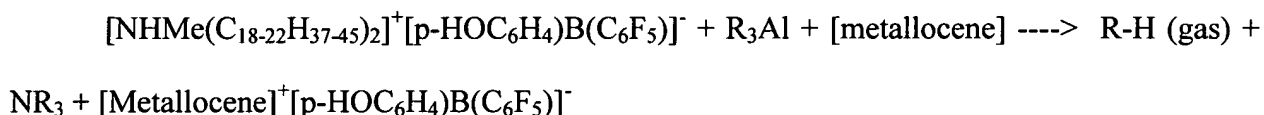
The instant claims are not anticipated or obvious unless the cited art teaches the presently claimed catalyst component. The present claims are directed to a particular catalyst composition and to a method of (co)-polymerizing olefins using the catalyst composition. The catalyst composition is prepared by the process recited in the claims. The claims are not obvious in view of a combination of references unless the combined references teach the same catalyst composition that is presently claimed. It is likely that the art teaches many of the reagents that are used to synthesize the presently claimed composition, but unless the references teach how to combine those reagents to make the presently claimed composition, and also provides motivation for doing so, the references do not render the present claims obvious.

Jacobsen is directed to catalyst components that comprise an ionic compound, an organometal or metalloid compound, a transition metal compound (metallocene), and a support. Ward is directed to a supported catalyst containing a transition metal catalyst precursor such as a metallocene, a support activator made from a support (such as an inorganic oxide), and an organohalide. As described below, there are several differences between the process for preparing the claimed catalyst composition and processes described in the cited references. In view of these differences, one of skill in the art would appreciate that the process recited in the present claims yields a different composition than any combination of steps that can be derived by combining the cited references.

The cited references do not teach or suggest reacting a compound having the formula R_3M with an amine that contains a nitrogen-hydrogen bond. Jacobsen teaches using an ammonium cation having an N-H bond to form a bulky ionic compound (a), e.g., $[NHMe(C_{18}$.

$_{22}H_{37-45})_2]^+[p-HOC_6H_4)B(C_6F_5)]^-$. This bulky ionic compound provides a bulky anion, e.g., $[p-HOC_6H_4)B(C_6F_5)]^-$ to stabilize a metallocene moiety, which is positively charged. *See, e.g.,* Jacobsen examples. Jacobsen does not teach a amine having an N-H bond. Amines are neutral, i.e., not positively charged like ammonium, and would not be suitable for the purposes of Jacobsen.

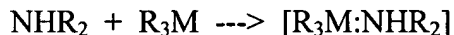
Jacobsen further suggests using an organometal or metalloid compound e.g., trialkyl aluminum to activate the metallocene. In other words, the organometal or metalloid is used as a co-catalyst to activate the metallocene. *See, Jacobsen examples.* The process for making the catalyst system of Jacobsen can be depicted:



The trialkyl metal is not reacted with an amine, as is recited in the present claims.

The Examiner alleged that it would be obvious to substitute the ionic compound of Jacobsen for the non-ionic compound of Ward (i.e., amine) where the amine coordinates with a Lewis Acid. However, Ward does not teach amines; rather, Ward teaches ammoniums of amines. *See, col. 5, l. 19.* Specifically, Ward teaches ionic compounds $[Ct]^+[M''(Q_1-Q_{n+1})]^-$ where $[Ct]^+$ can be ammonium cations and $[M''(Q_1-Q_{n+1})]^-$ can include **tetraalkyl** aluminum anions. The only non-ionic compounds that Ward discloses are bulky, non-coordinating neutral species, such as $B(C_6F_6)_3$. *See, col. 5, l. 54.* Ward does not teach an amine coordinating with a Lewis Acid; rather, Ward teaches ammonium coordinating with a bulky, non-coordinating anion. *See, col. 2, ll. 60-67 and col. 5, ll. 19-63.*

In contrast to Jacobsen and Ward, the present claims recite that an amine is reacted with a compound having the formula R_3M . One of skill in the art will appreciate that this forms a Lewis acid-base adduct:



Such a reaction is not disclosed in either Jacobsen or Ward. (The Examiner alleged that Ward disclosed such a reaction, but as explained above, Ward does not).

Neither reference teaches reacting the Lewis acid-base adduct with dialkylmagnesium.

Jacobsen mentions dialkylmagnesium, but does not teach reacting dialkylmagnesium with a Lewis acid-base adduct. Rather, Jacobsen teaches combining dialkylmagnesium with a metallocene. Ward allows for using dialkylmagnesium as a carrier, but does not teach or suggest reacting the Lewis acid-base adduct of the present invention with dialkylmagnesium.

In contrast to the cited references, the present claims recite reacting the product of step (a), i.e., the Lewis acid-base adduct of an amine with R_3M , with dialkylmagnesium. The product of this reaction is used to make the transition metal complex of the present invention.

Neither reference teaches reacting a compound containing a cyclic diene group with an early transition metal compound. Both Jacobsen and Ward refer to metallocene compounds, which contain cyclic diene anions such as cyclopentadiene anion. However, the references do not teach reacting a compound containing a cyclic diene group with an early transition metal compound. One of skill in the art will appreciate that mixing a cyclic diene, MR_3 , amine, MgR_2 , and a transition metal, as recited in the present claims, does not form a metallocene compound. Cyclic diene and alkyl aluminum or alkyl magnesium does not form a bond to transition metal halide in non-polar media to form metallocene compounds. Such a reaction requires an electron

donating solvent such a THF, and also requires lithium to deprotonate the diene to form the anion and thereby form the metallocene.


One of skill in the art will appreciate that the catalyst composition of the present claims can be represented:

$R_3M + \text{amine} + \text{dialkyl magnesium} + \text{diene} + \text{transition metal} \rightarrow [R_3M:NHR_2]/MgR_2/[Cd^{II}][M'O_pR_q^1X_r]$; where Rs are as defined in the specification. The Jacobsen and Ward references do not teach or suggest the steps necessary to make the presently claimed product. Applicants therefore respectfully request that the rejection under 35 U.S. § 103 be withdrawn.

No fees are believed to be due at this time, however, if any fees are required for any reason relating to this paper, the Commissioner is authorized to deduct said fees from Deposit Account No. 01-2508/10982.0007.NPUS00.

The Examiner is encouraged to call the undersigned should any further action be required for allowance.

Respectfully submitted,



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Date: March 9, 2005